



Name : .....  
Roll No. : .....  
Invigilator's Signature : .....

**CS/B.Tech (BT-OLD)/SEM-6/CHE-615/2013**

**2013**

**PROCESS INSTRUMENTATION AND CONTROL**

*Time Allotted : 3 Hours*

*Full Marks : 70*

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words  
as far as practicable.*

**GROUP – A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for any *ten* of the following :  
 $10 \times 1 = 10$
- i) Control valve is an example of the
    - a) final control device      b) measuring device
    - c) controller                  d) process.
  - ii) Bourdon gauge is used to measure
    - a) temperature                  b) liquid level
    - c) pressure                      d) speed
  - iii) Application of a float device can be observed in a/an
    - a) venturimeter                  b) orificemeter
    - c) rotameter                      d) thermometer
  - iv) Critically damped system means damping coefficient is
    - a) 1                                  b)  $> 1$
    - c)  $< 1$                               d) 0.



- v) Optical pyrometer is used to measure
- a) furnace
  - b) low temperature
  - c) moderate temperature
  - d) liquid.
- vi) Ratio control system is a special type of
- a) open loop system      b) feedback system
  - c) on-off system      d) feed forward system.
- vii) Macleod gauge is used to measure
- a) pressure      b) vacuum
  - c) flow rate      d) temperature
- viii) Which of the following is not a mechanical pressure sensing element ?
- a) U – tube      b) Bourdon tube
  - c) Diaphragm      d) Bellon.
- ix) Which has maximum offset in P, PI, PD and PID controller ?
- a) P      b) PID
  - c) PD      d) PI.
- x) Thermistor is used to measure
- a) temperature      b) pressure
  - c) volumetric flow rate      d) velocity
- xi) The material having highest value of gauge factor is
- a) Ni      b) Fe
  - c) Ag      d) Pt.



**GROUP – B**

**( Short Answer Type Questions )**

Answer any *three* of the following.  $3 \times 5 = 15$

2. Define the following terms used in process control :
  - a) Set point
  - b) Transducer
  - c) Span
  - d) Controller
  - e) Manual mode
3. Derive the transfer function of a first order system.
4. Write down the operating principle of resistance thermometer.
5. Describe ON-OFF control.
6. Explain feed back control.

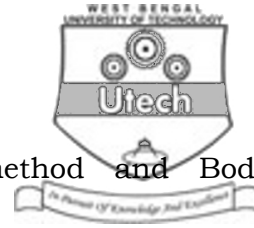
**GROUP – C**

**( Long Answer Type Questions )**

Answer any *three* of the following.  $3 \times 15 = 45$

7. Carry out a detail discussion of digital computer used for bio-process control such as Bio-fermenter.
8. Write short notes on the following :
  - a) Aneroid
  - b) Ionization gauge
  - c) Visual sensors.

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9. Define stability. Explain root-locus method and Bode diagram in detail.
10. a) Define proportional band.
- b) State why PD control action is referred to as anticipatory control.
- c) What do you mean by Gain Crossover Frequency and Phase Crossover Frequency.
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